Publications of Science Branch, Northwest Atlantic Fisheries Centre, St. John's, Newfoundland - 1985 to 2000

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Canadian Manuscript Report of Fisheries and Aquatic Sciences

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by

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Abstract

Coady, L.W., Drover, M.A., and Janes, F.T. 2002. Publications of Science Branch, Northwest Atlantic Fisheries Centre, St. John's, Newfoundland - 1985 to 2000. Can. Manuscr. Rep. Fish. Aquat. Sci. No. 2610: iv + 187 p.

This report lists publications of Science Branch, Department of Fisheries and Oceans (Newfoundland Region) for the period 1985 to 2000. The listing includes primary, interpretive, scientific, technical and popular articles. Selected analyses of publication trends are developed in the text.

Résumé

Coady, L.W., Drover, M.A., and Janes, F.T. 2002. Publications of Science Branch, Northwest Atlantic Fisheries Centre, St. John's, Newfoundland - 1985 to 2000. Can. Manuscr. Rep. Fish. Aquat. Sci. No. 2610: iv + 187 p.

Le présent rapport recense les publications de la Direction des sciences, ministère des Pêches et des Océans (Région de Terre-Neuve) de 1985 à 2000. Leur liste comprend des articles de fond, des articles explicatifs, scientifiques ou techniques et des articles de vulgarisation. Certaines tendances en matière de publications sont analysées dans le texte.

INTRODUCTION

In 1930, Dr. Harold Thompson, a scientist with Scottish Fisheries, visited Newfoundland under the auspices of the Empire Marketing Board to investigate fishery research requirements in Britain's oldest colony. It was Thompson's report "A Survey of the Fisheries of Newfoundland and Recommendations for a Scheme of Research" that led to the establishment of a Biological Laboratory at Bay Bulls, just south of St. John's, in 1931. From this start, an active fisheries research program has continued to the present day.

Throughout its history, the organization has been involved in the acquisition and interpretation of biological and other knowledge essential to the management of marine and freshwater resource species and their environment. Research capabilities have expanded northward and offshore in concert with a growing multinational fishery and present day activities extend geographically from the Gulf of St. Lawrence and Grand Banks to the Labrador Sea and Davis Strait (Fig. 1).

Fisheries research programs in Newfoundland today are administered from the Northwest Atlantic Fisheries Centre in St. John's. A fundamental measure of scientific achievement is found in the organization's publication record. This document lists publications of Science Branch, Department of Fisheries and Oceans [Newfoundland Region] for the period 1985 to 2000. It updates:

> Coady, L.W., and Maidment, J.M. 1985. Publications of the Fisheries Research Branch, Northwest Atlantic Fisheries Centre, St. John's, Newfoundland - 1931 to 1984. Can. Manuscr. Rep. Fish. Aquat. Sci. 1790: v + 159 p.

MILESTONES

Selected milestones having a bearing on research programs since 1931 are presented in Table 1 and include administrative changes, vessel deployments and various national and international initiatives. An overview of milestones for the period 1931 to 1984 was provided in Coady and Maidment (1985).

In 1986, physical oceanography and hydrography programs were established in Newfoundland as part of a national science integration initiative. Fisheries ecology and environmental programs were also expanded and in 1987 a national Centre of Disciplinary Expertise (CODE) in Resource Assessment and Survey Methodology was established in St. John's. The addition of the ice-strengthened TELEOST to the research vessel fleet in 1994 improved deepwater, multi-species and hydroacoustic survey capabilities. The promulgation of the Oceans Act in 1997 reaffirmed Canada's role in oceans and marine resource management and led to organizational adjustments in Fisheries and Oceans shortly thereafter.

Table 1. Selected milestones, 1931-2000.

1931	Establishment of Biological Laboratory, Newfoundland Fishery Research Commission at Bay Bulls, Newfoundland.
1931-36	Dr. H. Thompson, Director.
1931-35	Trawler *CAPE AGULHAS* contracted part time for fisheries surveys.
1934	Fisheries Research Commission dissolved by new Commission of Government. Organization renamed Fisheries Research Laboratory, Division of Fishery Research, Newfoundland Department of Natural Resources.
1936	Research staff relocated from Bay Bulls to Court House, St. John's as part of Government Analyst's Laboratory.
1937-43	Dr. W.F. Hampton, Director.
1937	Bay Bulls Laboratory destroyed by fire on April 19, 1937.
1940	New laboratory opened at the east end of Water Street, St. John's.
1944-72	Dr. W. Templeman, Director.
1946-70	25m (82 ft.) *INVESTIGATOR II* employed as first full-time research vessel.
1946-70	15m (50 ft) *PARR* employed as full-time research vessel (named *GRILSE* prior to 1950).
1949	Formation of International Commission for the Northwest Atlantic Fisheries (ICNAF).
1949	Organization renamed Newfoundland Biological Station, Fisheries Research Board of Canada (FRBC) upon Newfoundland's Confederation with Canada.
1953-74	20m (65 ft) *MARINUS* employed as full-time research vessel.
1958-83	54m (177 ft) A.T. CAMERON employed as full-time research vessel.
1964	Canada adjusted its traditional three-mile limit to encompass twelve miles.
1968	Canada became member of the International Council for the Exploration of the Sea (ICES).
1971	Newfoundland Technological Unit joined Newfoundland Biological Station.
1972-75	Dr. A.W. May, Director.
1972	Administrative and programming responsibilities for the Newfoundland Biological Station transferred from FRBC to the Research & Development Directorate of the Fisheries and Marine Service, Department of Environment.
1973-74	Introduction of groundfish TACs (total allowable catches) by ICNAF.
1975-present	23m (75 ft) *SHAMOOK* employed as full-time research vessel.
1975-78	A.M. Fleming, Director.
1975	Organization renamed Research & Resource Services.
1975	Resource Development Branch joined Research & Resource Services.
1977	Canada declared 200 mile zone of Extended Fisheries Jurisdiction.
1977	Formation of Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC).
1977-95	80m (264 ft) *GADUS ATLANTICA* employed as long-term charter for offshore fisheries research.
1978-81	E.J. Sandeman, Director.
1978-96	21m (70 ft) *MARINUS* employed as full-time research vessel replacing first *MARINUS*.
1978	Staff relocated to Northwest Atlantic Fisheries Centre (NAFC), White Hills, St. John's, Nfld.
1979	ICNAF replaced by Northwest Atlantic Fisheries Organization (NAFO).
1979	Research & Resource Services transferred from Department of Environment to new Department of Fisheries and Oceans.

Cont'd.

Table 1 (Cont'd.)

1981-90	M.C. Mercer, Director.
1981	Research responsibilities in the Gulf of St. Lawrence transferred from Newfoundland Region to new Gulf Region.
1982	Research & Resource Services renamed Fisheries Research Branch.
1982-present	50m (165 ft) *WILFRED TEMPLEMAN* employed as full-time research vessel replacing *A.T. CAMERON*.
1983	46th Annual Meeting of the American Society of Limnologists and Oceanographers (ASLO) held in St. John's.
1986	Fisheries Research Branch renamed Science Branch as part of national science integration initiative. Oceanography and hydrography programs established in St. John's.
1987-90	35m (115 ft) *MAXWELL* assigned to Newfoundland Region for coastal hydrographic mapping.
1987	Appointment of Task Group on the Newfoundland Inshore Fishery (TGNIF) chaired by Dr. L. Alverson.
1989	Appointment of Panel – Independent Review of the State of the Northern Cod Stock, chaired by Dr. L. Harris.
1990-96	L.W. Coady, Director.
1990-95	Northern Cod Science Program (Atlantic Fisheries Adjustment Program) funding provided to address recommendations of Harris Northern Cod Review Panel.
1991	51m (168 ft) *MATTHEW* employed as hydrographic vessel replacing *MAXWELL*. Vessel transferred to Scotia-Fundy Region.
1992	Moratorium on the northern cod fishery announced by Minister of Fisheries and Oceans (NAFO Divisions 2J3KL).
1992	Moratorium on the commercial Atlantic salmon fishery in insular Newfoundland.
1992	Fisheries Resource Conservation Council (FRCC) established replacing the Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC) and the Atlantic Groundfish Advisory Committee (AGAC).
1992	Court of Arbitration decision on the determination of maritime areas between Canada and the Republic of France with respect to the islands of St.Pierre and Miquelon off the south coast of Newfoundland.
1993	Moratorium on south coast Newfoundland cod fishery announced (NAFO Subdivision 3Ps).
1993	Responsibility for science activities in western Newfoundland and southeastern Labrador returned to Newfoundland Region.
1994	82nd Statutory Meeting of the International Council for the Exploration of the Sea (ICES) held in St. John's.
1994-present	63m (207 ft) *TELEOST* employed as full-time research vessel replacing *GADUS ATLANTICA*.
1994	Habitat Management (formerly in Fisheries Management Branch) joined Science Branch.
1995	Moratoria on major Grand Banks groundfish fisheries announced (NAFO Divisions 3LNO American plaice, 3LNO yellowtail flounder, 3NO cod).
1997	Oceans Act promulgated reaffirming Canada's role in oceans and marine resource management.
1997	Moratorium on the commercial Atlantic salmon fishery in Labrador.
1999-present	D.B. Atkinson, Regional Director.
2000	Science Branch renamed Science, Oceans & Environment Branch.

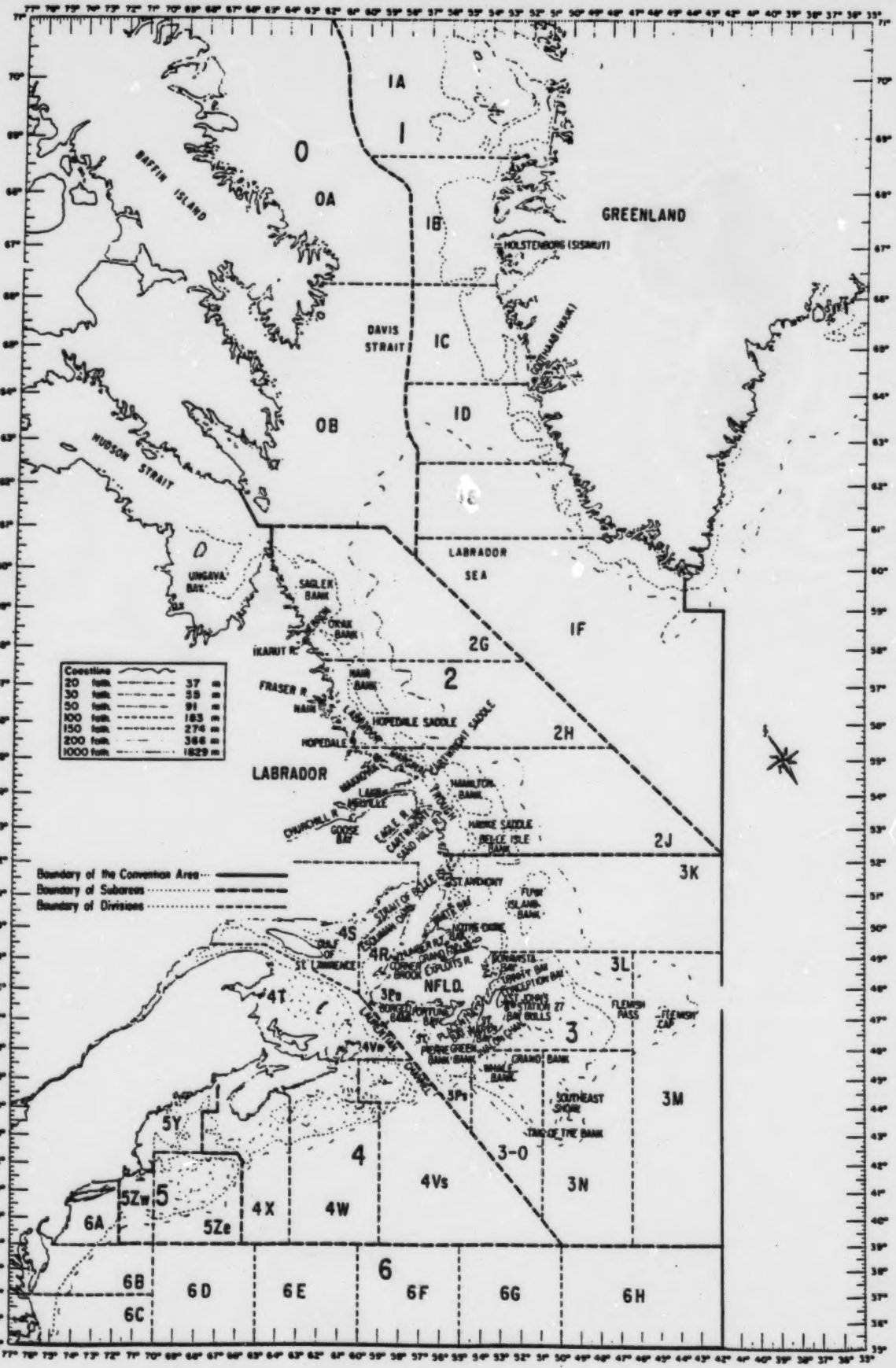

Figure 1. Northwest Atlantic research area -- Science Branch, Department of Fisheries and Oceans (Newfoundland Region).

Administrative arrangements relative to stock assessment and fisheries management have changed dramatically in the past decade. In 1989, the Minister of Fisheries and Oceans created an independent Panel, chaired by Dr. L. Harris, to consider available scientific information and the state and size of the northern (NAFO 2J3KL) cod stock. Recommendations of the Panel led to the establishment of a five-year Northern Cod Science Program (1990-95) enabling new initiatives and broader partnerships with universities, the fishing industry and the private sector. With continuing declines in the northern cod stock in the early 1990s, a fisheries moratorium was imposed in 1992. This led to the establishment of an advisory Fisheries Resource Conservation Council (FRCC). The FRCC replaced both the Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC) and Atlantic Groundfish Advisory Committee (AGAC) which had overseen fisheries management since extended jurisdiction in 1977. Fisheries moratoria for other groundfish stocks ensued - South Coast cod in 1993, Grand Bank plaice, yellowtail and cod in 1995. Marine fisheries for Atlantic salmon were also closed in 1992 on the island and in 1997 in Labrador.

The Canada-France boundary issue on the south coast of Newfoundland was resolved in 1992, changing approaches to the assessment and management of St. Pierre Bank (3Ps) stocks, primarily groundfish and scallops. An international working group has been established to review scientific information on stocks harvested by both countries.

As groundfish stocks diminished in importance in the 1990's, invertebrate fisheries, notably crab and shrimp, increased in importance. From 1987 to 1991, shellfish represented 26% (average) of revenue distribution in the Newfoundland fishery. By 2000, the overall value for shellfish had increased to 83%.

PUBLICATION LISTS

Publication lists were developed from internal records, library sources and national/international databases and circulated to staff to ensure completeness. Citations follow the current style, punctuation and format of the Canadian Journal of Fisheries and Aquatic Science. Careful attention was given to the proper use of abbreviations for journals (using BIOSIS Serial Sources) and volumes/paginations were checked for accuracy.

Publications listed in this report (Appendix 1) were prepared by researchers while employed by Science Branch. Any papers prepared by staff prior to taking positions with the Branch, or after leaving, are excluded regardless of topic, data sources or mailing addresses appearing in the article. Scientific publications authored by external staff but based on work funded by the Branch have been included.

CATEGORIZATION

For purposes of analysis, publications were grouped in four categories, as follows:

1. Primary publications

Primary publications are those reporting original findings and data for the first time in formally refereed and edited publications that are usually part of a regular journal series receiving general or unlimited distribution and that are usually abstracted and indexed routinely. Original research papers presented at symposia and that are published in their entirety, after formal refereeing and editing, in special proceedings of the symposium, are included in this category.

2. Interpretive scientific publications

These publications review a particular subject area or develop a comprehensive picture synthesized from a broad range of findings, part of which may be reported by the author for the first time and part of which may be synthesized from previously published works of others. This category includes critical reviews, chapters in books or entire books, perspectives, bulletins and other monographic works, special publications, etc., which are usually refereed and edited and which receive general or unlimited distribution and are usually abstracted and indexed routinely.

3. Scientific and technical reports

This category covers scientific and technical material intended for distribution of a more limited nature than for primary or interpretive categories. It would contain information which would not be acceptable as research journal or interpretive scientific publications and may be targeted to scientists, industry, policy makers and other special interest groups. Material is not usually refereed externally and is generally produced locally at individual institutions in limited numbers. Examples of such material are Canadian stock assessment documents, Northwest Atlantic Fisheries Organization (NAFO) research documents and NAFO Scientific Council Studies, Technical - Data - Manuscript - Hydrography - Contract Reports in the DFO Report Series, International Council for the Exploration of the Sea (ICES) reports and technical circulars. Conference proceedings, workshop reports, university theses and similar publications that are not refereed to journal standards are also included in this category.

4. Popular and miscellaneous publications

This material is written for distribution to audiences that generally differ from those for primary, interpretive and scientific or technical categories. Popular articles are targeted to clients needing an understanding of research projects and science in general. They are written in such a way that a generally non-scientific audience can readily grasp the information without having to wade through the maze of technical details. The

content would have some long-term value. Included would be fact sheets and magazine or newspaper items. Articles of a more miscellaneous nature would be book reviews, letters, editorials and obituaries.

Abstracts, working papers and posters were not considered publications for purposes of the present review. Papers presented at symposia were not listed unless included in formal proceedings receiving wide distribution. Proceedings material receiving only limited distribution among conference participants or member mailing lists was excluded.

SCIENTIFIC STAFF

The use of person-year utilization figures, rather than annual allocations of scientific person-years, vastly improves the analysis of publication trends.

A list of scientific staff employed by the Branch for the seventy year period 1931 to 2000 is provided in Appendix 2 and represents an update of the listing provided in Coady and Maidment (1985). Arrival and departure dates were developed from annual reports, administrative records and personal contacts and used to develop person-year utilization figures for various analyses. Extended periods of leave or assignment outside the Branch were excluded. No adjustments were made for educational leave as research responsibilities are maintained during these periods.

The following classification groups [continuing full-time and term only] were defined as scientific staff:

RES	--	research scientist
BI	--	biologist
CH	--	chemist
REM	--	research manager
CS	--	computer scientist
PC	--	physical scientist
ENG	--	engineer
ENG-SUR	--	survey engineer
EX	--	executive manager

Visiting [post-doctoral] fellows employed by the Branch for one to two year periods were included as were staff who continued in Scientist Emeritus positions following retirement. Visiting scientists from other laboratories and casual or contract employees were not listed. A small number of scientific staff in support roles [some CS-PC-ENG personnel] who do not usually author publications are included in the list of scientific staff but excluded in the analyses of publication trends.

The rules employed for person-year utilization as described above, are similar to those used in the Coady and Maidment (1985) review, enabling examination of long-term trends.

The organization of scientific staff from 1985 to 2000 is presented in Appendix 3. In conjunction with milestones listed in Table 1, organizational arrangements, by Division, depict changing research priorities and directions.

FINDING AID

A finding aid, matching publication topics to authors is provided in Table 2. Readers should also note:

- Annual Program Review and Evaluation (PRE) documents describing research activities on a project-by-project basis were prepared from 1985 to 1994-95, switching from calendar year to fiscal year reports starting in 1992-93. These are listed in Appendix 1 under *Anon.* and were compiled/edited by science coordination staff attached to the Director's Office.

- Since 1985, research documents for Canadian stock assessments appear in several series: CAFSAC (Canadian Atlantic Fisheries Scientific Advisory Committee) to 1992 (inclusive), AFISH (Atlantic Fisheries) 1993 to 1996 and CSAS (Canadian Stock Assessment Secretariat) 1997 to present. Stock status reports were instituted under AFISH in 1996 and continued under CSAS. Proceedings documents appear under CSAS starting in 1997. All stock status and proceedings documents appear, in Appendix 1, under *DFO.*

- For stocks managed by NAFO (Northwest Atlantic Fisheries Organization), the reader is referred to the NAFO SCR Doc.Series and NAFO Scientific Council Studies Series. Annual Canadian summaries of research activities, including specific sections for the Newfoundland Region, appear in the NAFO SCS Doc. series. Regional scientists also avail of the NAFO Journal (J. Northw. Atl. Fish. Sci.) for primary material.

- Canada has been a member of ICES (International Council for the Exploration of the Sea) since 1968 and regional scientists are active members of ICES Working Groups and other committees. Contributions to annual ICES Statutory Meetings appear in the ICES C.M. Series. The ICES Journal (ICES J. Mar. Sci.) is used, for primary material.

- Primary publications produced by regional scientists since 1985 appeared in more than 250 different international journals. This represents a substantial increase from the period 1950 to 1984 where only 85 or so journals were used (Coady and Maidment, 1985). The ten most commonly used journals since 1985 were as follows:

Can. J. Fish. Aquat. Sci.	22% of primary publications
J. Northw. Atl. Fish. Sci.	6%
ICES J. Mar. Sci.	4%
Can J. Zool.	3%
N. Am. J. Fish. Manage.	3%
Mar. Ecol. Prog. Ser.	2%
J. Fish. Biol.	2%
Fish. Res.	2%
Fish. Bull.	2%
Trans. Am. Fish. Soc.	2%

Only four of these journals appeared in the "top ten" for the period prior to 1985. Both *Can. J. Fish. Aquat. Sci.* and *J. Northw. Atl. Fish. Sci.* retain their positions as the two most commonly used journals. *Can. J. Zool.* and *Trans. Am. Fish. Soc.* remain on the list, both slipping one notch lower in the list of ten.

- The Departmental Report Series, which includes Technical, Manuscript, Data, Industry, Hydrography/Technical and Hydrography/Data Reports, remains popular with regional scientists with an average of ten contributions per annum between 1985 and 2000 (no change from preceding decade).

- Environmental assessment submissions to federal review Panels for major projects (eg. Hibernia offshore oil, Terra Nova offshore oil, Voisey's Bay Mine-Mill) appear in Appendix 1 under *Anon.*

ANALYSES

PUBLICATIONS BY CATEGORY

A breakdown of Science Branch publications by category is provided in Table 3. Total numbers are shown in Part A of the table with corresponding percentages in Part B.

In the sixteen year period 1985 to 2000, the Branch averaged 195 publications per annum with generally higher numbers in the 1993 to 1997 period associated with Northern Cod Science Program funding. Total publications exceed 3,100 listings.

On average, primary publications represent 27% of annual totals, although levels have declined (average 22%) since 1998. Interpretive scientific material varies from 1 to 3% per annum. Scientific and technical reports, largely stock assessment documentation, represent 65 % and popular and miscellaneous 6%.

While scientific and technical reports average 65 % of total publications since 1985, the five-year period 1996 to 2000 shows general increases of about 10 %. This can be explained by the introduction of stock status reports and proceedings in the mid-1990s.

Table 2. Finding aid matching publication topics to authors (names in brackets are first authors outside of Science Branch).

Topic	Authors
American plaice	Atkinson, Baird, Bowering, Brodie, Maddock Parsons, (McClintock), Morgan, Power, Walsh
Atlantic halibut	Bowering, (Neilson), (Trumble)
Atlantic salmon	
biology and assessment	Ash, Bourgeois, (Cairns), Dempson, Downton, Gibson, Hutchings, Lear, Mullins, Myers, O'Brien, O'Connell, Pippy, Porter, Reddin, Ryan, Shelton, Stansbury, Warren
West Greenland	(Friedland), Millar, (Potter), (Rago), Reddin, (Russell)
productive capacity	Clarke, Gibson, (Knoechel), Porter, Ryan, Scruton
enhancement	Anderson T., Bourgeois, (Gibbons), Pepper, O'Connell
creel survey	Hoenig, (Pollock)
Aquaculture	
salmonids	Anderson M., Penney, Pepper, (Tlusty), (Shahidi)
shellfish	Penney, Naidu, Schwinghamer
fish heath	Banoub, Shaw
Arctic char	Dempson, (Hammar), LeDrew, (Radtke), Shears
Arctic (polar) cod	Baird, Bowering, Lear, (Lidster), Lilly
Assessment methodology	Barrowman, Cadigan, Evans, Fahrig, Hoenig, Millar, Myers, (Restrepo), Rice, Shelton
Brook trout	Clarke, Gibson, Orr, Ryan, (Thonney), Scruton
Capelin	
biology and assessment	Anderson J., Atkinson, Carscadden, Dalley, (Frank), Hoenig, Lilly, Miller, Mowbray, Nakashima, (O'Driscoll), Shackell, Shelton, Wheeler, Winters
early life history	Anderson J., Carscadden, Dalley, (Frank), Nakashima
aerial photography	(Borstad), Nakashima
Clams	Lilly, Naidu
Cod	
biology and assessment	Atkinson, Baird, Bishop, Brattey, Brodie, Cadigan, Davis, Evans, Hutchings, Kulka, Lear, (McClintock), Morgan, Murphy, Myers, Pinhorn, Rice, Rose, Shelton, Stansbury, Taggart, Wells, Winters, Xu
juvenile cod	Anderson J., Dalley, Davis, Gregory, Lilly. (Methven), Murphy
food and feeding	DeBlois, Fahrig, Lilly
tagging studies	Barrowman, Brattey, Cadigan, Hoenig, Lear, Myers, Rice, Taggart
behaviour and physiology	(Goddard), Kiceniuk, Morgan, Rose
Environmental sciences	
habitat research	Anderson M., (Bradbury), Clarke, Gibson, Goosney, McCubbin, Roberge, Scruton
toxicology	Banoub, Fancey, Hellou, Kiceniuk, Morgan, Payne, Ray, Willliams, (Yuen)
acid rain	Coady, (Earle), Ryan, Scruton, Shaw

Cont'd.

Table 2 (Cont'd.)

Topic	Authors
Fisheries ecosystems	
plankton	Anderson J., Dalley, Evans, Myers, Paranjape, Penney, (Rivkin), Shelton
benthos	Gilkinson, (Gordon), (Prena), Rowell, Schwinghamer
chemical oceanography	Pepin
early life history	Anderson J., Dalley, Gregory, Hoenig, Myers, Pepin, Rice, Taggart
seabird-fisheries interactions	(Montevecchi), Myers
fish assemblages	(Gomes), (Haedrich), Rice, Pinhorn
Fisheries management systems	(Halliday), Pinhorn
Gear technology/ comparative fishing	Cadigan, McCallum, Millar, Stansbury, Walsh, Warren
Genetics	
Arctic char	(Bernatchez), Dempson, (Hammar), Verspoor
capelin	Carscadden, (Dodson)
cod	(Beacham), Bishop, Brattey, Pepin, (Ruzzante), Taggart
Greenland halibut	Bowering, (Vis)
parasites	Brattey
redfish	Power
salmon	(Beacham), Dempson, Reddin, Verspoor
seals	(Perry), Stenson
scallops	(Kenchington), Naidu
shrimp	Parsons
general	*Bourgeois, (Khan), Millar, Pippy*
Greenland halibut	Baird, Bowering, Brodie, Cadigan, (Chumakov), Kulka, Lilly, Morgan, Orr, Power
Grenadier	Atkinson, Kulka, Morgan, Power, (Savvatimsky), Templeman
Groundfish commercial sampling	Davis, (Inkpen), Kulka, Stevenson
Haddock	Baird, Bishop, Murphy, (Trippel)
Hake	Kulka, Mowbray
Herring	Dalley, Warren, Wheeler, Winters
Hydroacoustics	
capelin	Carscadden, Miller, Nakashima
cod	Anderson J., Baird, Brattey, Dalley, Lang, Murphy, Porter, Rose, Stevens, Wheeler
herring	Wheeler, Winters
methodology	Atkinson, Lang, (O'Boyle), Rose, (Simard), Stevens
redfish	Atkinson
Hydrography (sailing directions)	Anon.

Cont'd.

Table 2 (Cont'd.)

Topic	Authors
Leatherback turtle	Goff, Stenson
Lobster	Conan, Ennis
Lumpfish	Baird, Bishop, Hoenig, Murphy, Myers, Stansbury, Stevenson
Mackerel	(Castonguay), Pepin, Rose, (Runge)
Marine Mammals	
otter	Stenson
narwhal	Roberge
seals	Cadigan, (Hammill), Lawson, (Malouf), Ni, Myers, (Perry), Shelton, Sjare, Stenson, Warren
walrus	Sjare
whales	Carscadden, Hay, (Lien), Sjare, Stenson, (Whitehead)
Monkfish	Kulka
Oceans	
coastal classification	Anderson M., (Catto), O'Brien, Scruton, Williams
marine protected areas	Anderson T., Bishop, Brodie
ocean policy	Tillman
Parasitology	
Arctic char	(Bouillon), Dempson
cod	Baird, Bishop, Brattey, Myers, Pippy, Wells
seals	Brattey, Ni, Stenson, Templeman
shrimp	Parsons
general	Brattey, (Bullini), (Nascetti), (Paggi)
Physical oceanography	Akenhead, Colbourne, (Drinkwater), Helbig, Mertz, Myers, Narayanan, (Petrie). Rice, Senciall, (Webster)
Pollock	Bishop, Murphy, (Trippel)
Rainbow trout	Porter
Redfish	Atkinson, Baird, Bowering, Brodie, Fahrig (Gorchinsky), Morgan, Mowbray, Ni, Orr, Penney, Power, Templeman
Sand lance	Dalley, Winters
Scallops	Naidu, Stansbury
Sea lamprey	Dempson, Porter
Sharks	(Campana), Kulka, Mowbray, Walsh
Shrimp	Conan, Evans, Kulka, Lilly, Orr, Parsons

Cont'd.

Table 2 (Cont'd)

Topic	Authors
Skates	Atkinson, Kulka, Templeman
Snow crab	Dawe, Ennis, Hoenig, Taylor, Warren, Xu
Squid	Beck, (Black), Dawe, Mercer, (O'Dor), (Rodhouse)
Sticklebacks	Ryan
Stratification schemes (groundfish)	Bishop, Bowering, Murphy
Swordfish	Hoenig, (Restrepo)
Winter (blackback) flounder	Kulka
Witch flounder	Atkinson, Bowering, Brodie, Kulka (McClintock), Orr, Power
Wolffish (catfish)	Kulka, Templeman
Yellowtail flounder	Baird, Bowering, Brodie, Kulka, Maddock Parsons, Morgan, Orr, Power, Stansbury Walsh

Table 3. Science Branch publications 1985-2000, by publication category.

Year	Publication Category: Primary	Interpretive Scientific	Scientific and Technical	Popular and Miscellaneous	Total
			A. Numbers		
1985	39	4	93	11	147
1986	48	1	128	12	189
1987	44	1	107	4	156
1988	46	-	79	6	131
1989	45	2	87	5	139
1990	54	4	117	3	178
1991	40	1	118	37	196
1992	64	-	96	36	196
1993	70	7	134	26	237
1994	62	5	126	34	227
1995	57	3	167	22	249
1996	44	3	182	6	235
1997	79	2	153	9	243
1998	46	2	153	5	206
1999	41	-	144	2	187
2000	42	-	161	1	204
			B. Percentages		
1985	27	3	63	7	100
1986	25	1	68	6	100
1987	28	1	68	3	100
1988	35	-	60	5	100
1989	32	1	63	4	100
1990	30	2	66	2	100
1991	20	1	60	19	100
1992	33	-	49	18	100
1993	30	3	57	10	100
1994	27	2	56	15	100
1995	23	1	67	9	100
1996	19	1	77	3	100
1997	33	1	62	4	100
1998	22	1	75	2	100
1999	22	-	77	1	100
2000	21	-	78	1	100

The hiring of a science writer [Lawrence Jackson] under the Northern Cod Science Program explains the higher percentage of popular material in the 1991 to 1995 period. Jackson prepared numerous articles for publication in community newspapers around the province. Many of his pamphlets, such as The Science of Capelin, received wide distribution in the fishing industry and as educational materials. The low numbers of popular writings since Jackson's departure warrant review by Science - Communications managers.

PUBLICATIONS PER PROFESSIONAL PERSON-YEAR

Information on overall publication productivity can be found in Table 4, which provides publication levels based on professional person - year utilization.

Professional person-year utilization rose from 60 in the mid-1980's to 76 in 1995. Declines in the following three years are associated with the demise of the five-year Northern Cod Science Program as well as federal-wide program review reductions. Staff levels have increased since 1998.

For the period 1985 to 2000, the Branch produced, on average, 3.0 publications per professional per year of which 2.0 appeared in the scientific and technical literature and 0.8 in refereed primary/interpretive material. These levels are "up" from the decade preceding [1975 to 1984] where researchers produced 2.2 publications per year of which 1.4 appeared as scientific and technical and 0.6 in the primary literature [Coady and Maidment, 1985].

For primaries, the four highest years (1992, 1993, 1994, 1997) coincide with Northern Cod Science Program funding and NCSP symposium proceedings published in 1997. There has been a gradual decline in primary production by Branch researchers commencing in 1998.

Levels of scientific and technical publications per professional person year have been consistently higher since 1995, and coincide with the introduction of stock status reports.

The high levels of popular and miscellaneous materials from 1991 to 1995 are, again, due to the concerted efforts of a dedicated science writer funded under the Northern Cod Science Program.

PUBLICATIONS BY SUBJECT AREA

Table 5 provides a breakdown of publications by subject area. All figures are expressed as percentages. The Table has three parts, providing breakdowns on the basis of selected publication categories (popular and miscellaneous not included). The information in Table 5 was averaged over the sixteen-year review period (1985 to 2000) to illustrate broader trends:

	Total Publications	Primary/ Interpretive Scientific	Scientific/ Technical
Resource Assessment (and related)	**73%**	**57%**	**81%**
subsets:			
Groundfish	*30*	*18*	*35*
Pelagic Fish	*8*	*5*	*10*
Invertebrates	*9*	*8*	*11*
Anadromous	*17*	*14*	*17*
Marine Mammals	*4*	*5*	*3*
Assessment Methodology	*5*	*7*	*5*
Fisheries Ecosystems	**6**	**13**	**3**
Physical Oceanography	**5**	**4**	**5**
Environmental Research	**10**	**17**	**7**
Aquaculture and Fish Health	**3**	**8**	**1**
OTHER (uncategorized)	**3**	**1**	**3**

- The figures shown for "assessment methodology" (under resource assessment) include titles which are not species-specific i.e. generic analyses with broader application. A Centre of Disciplinary Expertise (CODE) for Resource Assessment and Survey Methodology was in place the Newfoundland Region from 1987 to 1997, to conduct research on practical problems and develop improved models and procedures.

- The figures shown for "fisheries ecosystems" include contributions which are <u>not</u> specifically tied to the process of resource assessment. This would include such things as primary production (plankton) investigations, benthic studies, early life history modelling, etc.

- The figures shown as "Other (uncategorized)" are made up of a mix of materials dealing with contributions in hydrography, oceans management, environmental assessment/habitat management, gear technology (not species specific) and parasitology.

- Virtually three-quarters (73%) of **total publications** provide resource assessment and related information with groundfish material constituting 30% of the total, anadromous 17%, invertebrates 9%, pelagic fish 8%, marine mammals 4% and assessment methodology 5%. Environmental research follows resource assessment, representing 10% of total publications. Fisheries ecosystems research averages 6%, physical oceanography 5% and aquaculture and fish health 3%.

Table 4. Publications 1985-2000, per professional person year utilization.

Year	Professional Person-Years	Primary/ Interpretive Scientific (combined) per Professional	Scientific and Technical per Professional	Popular and Miscellaneous per Professional	Total Publications per Professional
1985	60.5	0.7	1.5	0.2	2.4
1986	60.3	0.8	2.1	0.2	3.1
1987	60.5	0.7	1.8	0.1	2.6
1988	63.9	0.7	1.2	0.1	2.0
1989	70.2	0.7	1.2	0.1	2.0
1990	70.3	0.8	1.7	<0.1	2.5
1991	71.0	0.6	1.7	0.5	2.8
1992	69.8	0.9	1.4	0.5	2.8
1993	72.7	1.1	1.8	0.4	3.3
1994	74.0	0.9	1.7	0.5	3.1
1995	75.8	0.8	2.2	0.3	3.3
1996	70.6	0.7	2.6	0.1	3.4
1997	68.1	1.2	2.3	0.1	3.6
1998	65.0	0.7	2.4	0.1	3.2
1999	70.9	0.6	2.0	<0.1	2.6
2000	77.7	0.5	2.1	<0.1	2.6
Average (1985-2000)		0.8	2.0	0.2	3.0

Table 5. Publications, 1985-2000, by subject area (expressed as percentages).

Subject area	Year															
	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00
A. Total Publications																
Total Resource Assessment	79	77	72	65	78	72	71	72	69	66	71	75	69	77	74	75
subsets (resource assessment)																
- Groundfish	29	33	33	26	25	21	28	25	29	32	32	35	27	28	37	36
- Pelagic Fish	9	6	8	7	8	9	7	12	6	11	8	11	7	6	8	8
- Invertebrates	11	8	5	11	13	13	12	10	8	4	6	8	10	11	9	8
- Anadromous	24	23	22	17	18	13	11	14	17	9	13	11	17	25	14	16
- Marine Mammals	3	4	1	3	4	3	4	4	4	3	8	5	4	3	4	5
- Assessment Methodology	3	3	3	1	10	13	9	7	5	7	4	5	4	4	2	2
Fisheries Ecosystems	5	4	8	13	4	4	6	6	8	5	6	5	4	3	5	7
Physical Oceanography	2	4	4	8	1	6	4	6	6	9	5	4	4	4	5	6
Environmental Research	5	10	10	8	8	8	7	4	8	13	13	12	18	10	12	6
Aquaculture and Fish Health	4	2	4	1	3	6	5	4	3	3	2	3	1	3	2	3
Other (uncategorized)	5	3	2	5	6	4	7	8	6	4	3	1	4	3	2	3
B. Primary and Interpretive Scientific (combined)																
Total Resource Assessment	69	69	52	48	73	45	49	56	58	60	44	57	57	62	54	58
subsets (resource assessment)																
- Groundfish	11	13	13	13	24	8	15	19	18	25	17	23	27	11	28	19
- Pelagic Fish	9	4	9	2	7	7	3	6	4	10	2	5	2	0	0	2
- Invertebrates	13	15	3	9	2	12	8	7	9	6	3	2	5	11	2	16
- Anadromous	29	33	24	15	24	5	5	6	20	9	7	8	8	22	9	7
- Marine Mammals	7	2	3	7	7	8	3	6	4	0	3	2	8	9	7	9
- Assessment Methodology	0	2	0	2	9	5	15	12	3	10	12	16	8	9	8	5
Fisheries Ecosystems	11	8	13	22	8	10	18	13	21	9	21	14	8	10	16	12
Physical Oceanography	0	0	0	4	0	10	10	4	4	6	7	0	5	2	0	2
Environmental Research	7	15	24	13	15	15	10	6	9	17	21	23	24	20	26	19
Aquaculture and Fish Health	13	6	11	4	4	18	10	13	7	7	5	5	3	4	2	9
Other (uncategorized)	0	2	0	9	0	2	3	8	1	1	2	2	2	2	2	0
C. Scientific and Technical																
Total Resource Assessment	84	80	78	74	81	86	80	90	79	78	81	81	76	84	80	80
subsets (resource assessment)																
- Groundfish	38	42	42	33	26	27	32	30	34	34	35	39	28	35	39	44
- Pelagic Fish	10	7	7	10	9	10	10	18	8	12	11	13	11	8	10	3
- Invertebrates	11	6	6	14	19	14	14	16	9	4	7	10	13	12	12	7
- Anadromous	19	18	19	16	14	17	14	17	17	14	15	11	21	25	15	19
- Marine Mammals	2	4	0	1	2	1	2	3	4	6	11	5	2	1	3	5
- Assessment Methodology	4	3	4	0	11	17	8	6	7	8	2	3	1	3	1	2
Fisheries Ecosystems	3	3	7	9	2	2	3	1	2	2	1	3	2	1	2	6
Physical Oceanography	3	5	7	10	3	3	0	2	7	8	5	5	4	5	7	7
Environmental Research	4	8	6	5	6	5	7	5	7	9	9	7	13	6	8	3
Aquaculture and Fish Health	0	1	1	0	0	0	5	0	1	0	1	2	0	1	1	1
Other (uncategorized)	6	3	1	2	8	4	5	2	4	3	3	2	5	3	2	3

- For externally refereed publications (**primary/interpretive scientific**) 57% relate to resource assessment of which groundfish and anadromous are the most significant contributors (18% and 14% respectively). Environmental research at 17% is equivalent to groundfish in productivity followed by fisheries ecosystems, equivalent to anadromous.

- Eighty-one percent of **scientific and technical** publications relate to resource assessment - 35% groundfish, 17% anadromous, 11% invertebrates, 10% pelagics and 3% marine mammals. Assessment methodology represents 5% of scientific and technical material, environmental research 7%, physical oceanography 5% and fisheries ecosystems (not species-specific) 3%.

- Primary/interpretive publications for anadromous species have generally declined from 1990 (Table 5). Publication levels in the environmental sciences have generally increased from 1994.

- Significant national and international collaboration is evident in multi-authored publications.

SUMMARY AND RECOMMENDATIONS

- In the sixteen-year period 1985 to 2000, Science Branch (Newfoundland Region) published in excess of 3,100 publications, averaging 195 documents per annum.

- About 30% of Branch publications prepared annually appear in formally refereed primary or interpretive scientific articles.

- About 65% of Branch publications prepared annual are scientific and technical reports, largely stock assessment documentation.

- For the period 1985 to 2000, Science Branch produced, on average, 3.0 publications per professional per year of which 0.8 appeared as refereed primary/interpretive material and 2.0 appeared in the scientific and technical literature.

- The foregoing numbers have increased from the decade preceding (1975 to 1984) when the Branch produced 2.2 publications per professional per year (0.6 primary/interpretive and 1.4 scientific and technical).

- The Branch has experienced a gradual decline in primary publication production, commencing in 1998. Levels of scientific and technical publications have increased since 1995.

- Virtually three-quarters (73%) of total Branch publications from 1985 provide resource assessment and related information.

- Fifty-seven percent (57%) of primary/interpretive publications relate to resource assessment of which groundfish and anadromous researchers are the most significant contributors.

- Significant increases in the production of environmental research publications have occurred since 1994.

- Popular and miscellaneous writings intended for public use have declined significantly since Northern Cod Science Program funding ended in 1995.

- Primary publications produced by regional scientists since 1985 appeared in more than 250 different journals, a marked increased from the 85 journals used from 1950 to 1984. Significant national and international collaboration is evident in multi-authored publications.

- The most commonly used journals (from 1985) are the Canadian Journal of Fisheries and Aquatic Sciences (22% of primaries) and NAFO's Journal of Northwest Atlantic Fisheries Science (6%). There were the journals of choice in the decade preceding 1985 as well.

- The Department Report Series remains popular with regional scientists with an average of 10 contributions per annum from 1985 (no change from the previous decade).

- Five **recommendations** are offered for consideration by Science Branch managers:

    - assign a dedicated individual to track publications, prepare annual listings for review by staff and provide ongoing analyses of publication trends;

    - add full publication listing (1931 to present) to Science Branch website and provide word search capabilities to improve public/student access;

    - meet with Communications Branch staff to consider strategies to improve the production of popular scientific articles;

    - revitalize important DFO Report Series nationally, standardizing/ improving cover format, review, reporting and distribution procedures; and,

    - expand analyses of publication trends at the Division/Section level utilizing tables in the present report.

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Appendix 1: Publications of Science Branch, 1985-2000

Addison, R.F., **Lockhart**, L., and **Payne**, J.F. 1996. Evaluating the utility of "biomarkers" to indicate the biological effects of contaminants on Arctic marine mammals and fish. p. 221-222, *In* J.L. Murray, R.G. Shearer, and S.L. Han (eds.), Synopsis of Research Conducted Under the 1994/95 Northern Contaminant Program. Environmental Studies North 73. ISBN 0-662-24414-1. Minister of Public Works and Government Services of Canada.

Addison, R.F., and **Payne**, J.F. 1986. Assessment of hepatic mixed function oxidase induction in winter flounder (*Pseudopleuronectes americanus*) as a marine petroleum pollution monitoring technique, with an appendix describing field measurements of MFO activity. Can. Tech. Rep. Fish. Aquat. Sci. 1505: 34 p.

Aggett, D., **Gaskill**, H.S., **Finlayson**, D., **May**, S., **Campbell**, C., **Bobbitt**, J., **Lear**, W.H., and **Rice**, J.C. (eds.) 1987. A study of factors influencing availability of cod in Conception Bay, Newfoundland, in 1985. Can. Tech. Rep. Fish. Aquat. Sci. 1562: 123 p.

Aglen, A., **Engas**, A., **Godo**, O.R., **McCallum**, B., **Stansbury**, D., and **Walsh**, S.J. 1997. Density dependent catchability in bottom trawl surveys. ICES C.M.1997/W:16. 8p.

Akenhead, S.A. 1986. Water retention over Flemish Cap. p. 283-293, *In* S. Skreslet (ed.) The role of freshwater outflow in coastal marine ecosystems. Springer-Verlag, Berlin.

Akenhead, S.A. 1986. The decline of summer subsurface temperatures on the Grand Bank, at 47°N, 1978-1985. NAFO SCR Doc. 86/25, Ser. No. N1139. 8p.

Akenhead, S.A. 1987. Temperature and salinity off Newfoundland: Station 27 annual cycle and residuals. NAFO SCR Doc. 87/66, Ser. No. N1355. 20p.

Akenhead, S.A., and **Batstone**, S. 1987. Aircraft expendable bathythermograph data collected along 47°N in May, 1987. NAFO SCR Doc. 87/64, Ser. No. N1353. 7p.

Akenhead, S.A., and **Bobbitt**, J. 1986. The capacity of Lake Melville Fjord to store runoff. p. 183-194, *In* S. Skreslet (ed.) The role of freshwater outflow in coastal marine ecosystems. Springer-Verlag, Berlin.

Anderson, J.T. 1986. Review of recruitment variability in exploited marine fish stocks and survival during the larval stage. NAFO SCR Doc. 86/96, Ser. No. N1222. 12p.

Anderson, J.T. 1988. A review of size dependent survival during pre-recruit stages of fishes in relation to recruitment. J. Northw. Atl. Fish. Sci. 8: 55-66.

Anderson, J.T. 1990. Seasonal development of invertebrate zooplankton on Flemish Cap. Mar. Ecol. Prog. Ser. 67: 127-140.

Anderson, J.T. 1992. The feeding ecology of larval and juvenile redfish (*Sebastes* sp.) on Flemish Cap. PhD Thesis, Dept. of Zoology, Univ. British Columbia. 238 p.

Anderson, J.T. 1993. Distributions of juvenile cod in NAFO Divisions 2J3KL during fall, 1981-92, in relation to bathymetry and bottom temperatures. NAFO SCR Doc. 93/68, Ser. No. N2252. 18p.

Anderson, J.T. 1994. Feeding ecology and condition of larval and pelagic juvenile redfish *Sebastes* spp. Mar. Ecol. Prog. Ser. 104: 211-226.

Anderson, J.T., **Brattey**, J., **Colbourne**, E., **Miller**, D.S., **Porter**, D.R., **Stevens**, C.R., and **Wheeler**, J.P. 1998. Distribution and abundance of Atlantic cod from the 1997 Division 3KL inshore acoustic survey. DFO Can. Stock Assess. Sec. Res. Doc. 98/49. 85p.

Anderson, J.T., and **Colbourne**, E. 2000. Recruitment, pre-recruit survival and mortality in three Newfoundland cod stocks: northern (2J3KL), southern Grand Banks (3NO) and St. Pierre Bank (3Ps). DFO Can. Stock Assess. Sec. Res. Doc. 2000/116. 26p.

Anderson, J., and **Dalley**, E. 1993. Inshore/offshore distributions and abundances of pelagic 0-group cod in NAFO Divisions 3K and 3L in fall of 1991 and 1992. NAFO SCR Doc. 93/32, Ser. No. N2212. 6p.

Anderson, J.T., and **Dalley**, E.L. 1995. Spawning and recruitment of northern cod as measured by pelagic juvenile cod surveys following stock collapse, 1991-1994. DFO Atl. Fish. Res. Doc. 95/89. 25p.

Anderson, J.T., and **Dalley**, E.L. 1995. Nearshore distribution and abundance of juvenile Atlantic cod (*Gadus morhua*) at two sites in coastal waters of Newfoundland. DFO Atl. Fish. Res. Doc. 95/90. 11p.

Anderson, J.T., and **Dalley**, E.L. 1995. Distributions and abundances of pre-recruit capelin (*Mallotus villosus*) in the Newfoundland Region, 1991-94. p.133-145, *In* Anon. 1995. Capelin in SA2 + Div. 3KL. DFO Atl. Fish. Res. Doc. 95/70. 338 p.

Anderson, J.T., and **Dalley**, E.L. 1996. Distribution and abundances of pre-recruit capelin (*Mallotus villosus*) in the Newfoundland Region (2J3KL), 1994 and 1995. p. 185-199, *In* Anon. 1996. Capelin in SA2 + Div. 3KL. DFO Atl. Fish. Res. Doc. 96/90. 269 p.

Anderson, J.T., and **Dalley**, E.L. 1996. Pelagic juvenile cod (*Gadus morhua*) in the Newfoundland Region (2J3KLNO), 1994 and 1995. NAFO SCR Doc. 96/43, Ser. No. N2718. 10p.

Anderson, J.T., and **Dalley**, E.L. 1997. Year-class strength of northern cod (2J3KL) estimated from pelagic juvenile fish surveys in the Newfoundland Region, 1994, 1995 and 1996. NAFO SCR Doc. 97/41, Ser. No. N2875. 14 p. + corrigendum.

Anderson, J.T., and **Dalley**, E.L. 1997. Spawning and year-class strength of northern cod (*Gadus morhua*) as measured by pelagic juvenile cod surveys, 1991-1994. Can. J. Fish. Aquat. Sci. 54(Suppl.): 158-167.

Anderson, J.T., and **Dalley**, E.L. 1997. Year-class strength of northern cod (2J3KL) estimated from pelagic juvenile fish surveys in the Newfoundland Region, 1994, 1995, and 1996. DFO Can. Stock Assess. Sec. Res. Doc. 97/73. 19p.

Anderson, J.T., and **Dalley**, E.L. 1997. The nekton of the coastal and shelf waters of Newfoundland. DFO Can. Stock Assess. Sec. Res. Doc. 97/124. 30p.

Anderson, J.T., and **Dalley**, E.L. 1997. Distributions and abundances of pre-recruit capelin (*Mallotus villosus*) in the Northwest Atlantic (NAFO Division 2J3KLNO), 1991-96. p. 125-147, *In* Anon. 1997. Capelin in SA2 + Div. 3KL. DFO Can. Stock Assess. Sec. Res. Doc. 97/29. 188 p.

Anderson, J.T., and **Dalley**, E.L. 1998. Year-class strength of Northwest Atlantic capelin (2J3KLNO) estimated from pelagic juvenile fish surveys in the Newfoundland Region, 1991-97. p. 114-133, *In* Anon. 1998. Capelin in SA2 + Div. 3KL. DFO Can. Stock. Assess. Sec. Res. Doc. 98/63. 152 p.

Anderson, J.T., and **Dalley**, E.L. 1998. Plankton and nekton of the Northeast Newfoundland Shelf and Grand Banks in 1997. DFO Can. Stock Assess. Sec. Res. Doc. 98/121. 29p.

Anderson, J.T., and **Dalley**, E.L. 2000. Interannual differences in spawning time and growth rates of pelagic juvenile cod in Newfoundland waters. Fish. Res. 46: 227-238.

Anderson, J.T., and **Dalley**, E.L. 2000. Trawl and acoustic survey in southern Bonavista Bay - observations on demersal distribution of Atlantic cod. DFO Can. Stock Assess. Sec. Res. Doc. 2000/95. 13p.

Anderson, J.T., **Dalley**, E.L., and **Carscadden**, J.E. 1993. Distribution and abundance of pelagic 0-group cod in inshore and offshore areas for the northern cod stock (NAFO 2J3KL). NAFO SCR Doc. 93/30, Ser. No. N2210. 24p.

Anderson, J.T., **Dalley**, E.L., and **Carscadden**, J.E. 1995. Abundance and distribution of pelagic O-group cod (*Gadus morhua*) Newfoundland waters: inshore versus offshore. Can. J. Fish. Aquat. Sci. 52: 115-125.

Anderson, J.T., **Dalley**, E.L., and **Carscadden**, J.E. 1999. Absolute abundance and biomass of juvenile and adult capelin (*Mallotus villosus*) in the Newfoundland Region (2J3KLNO) estimated from the pelagic juvenile fish surveys, 1994-98. p. 112-125, *In* Anon. 1999. Capelin in SA2 + Div. 3KL. DFO Can. Stock Assess. Sec. Res. Doc. 99/206. 196 p.

Anderson, J.T., **Dalley**, E.L., and **Colbourne**, E. 1999. Recent trends in the dominant pelagic fish species and environment in the Northwest Atlantic, NAFO 2J3KLNO. DFO Can. Stock Assess. Sec. Res. Doc. 99/114. 15p.

Anderson, J.T., **Dalley**, E.L., and **Davis**, D.J. 1998. Year-class strength of northern cod (2J3KL) estimated from pelagic juvenile fish surveys in the Newfoundland region, 1994-1997. DFO Can. Stock Assess. Sec. Res. Doc. 98/11. 20p.

Anderson, J.T., **Dalley**, E.L., and **Davis**, D.J. 1999. Year-class strength of northern cod (2J3KL) and southern Grand Bank cod (3NO) estimated from the pelagic juvenile fish survey in 1998. DFO Can. Stock Assess. Sec. Res. Doc. 99/80. 20p.

Anderson, J.T., **Dalley**, E.L., and **Davis**, D.J. 1999. Year-class strength of Northwest Atlantic capelin (2J3KLNO) estimated at the larval stage and age one based on the pelagic juvenile fish surveys, 1994-98. p. 126-141, *In* Anon. 1999. Capelin in SA2 + Div. 3KL. DFO Can. Stock Assess. Sec. Res. Doc. 99/206. 196 p.

Anderson, J.T., **Dalley**, E.L., **Murphy**, A., and **Lang**, C. 1999. Inshore acoustic estimates of cod distributions near bottom in Bonavista Bay. DFO Can. Stock Assess. Sec. Res. Doc. 99/104. 6p.

Anderson, J.T., and **de Young**, B. 1993. Stage dependent specific gravity of cod eggs and larvae (*Gadus morhua L.*) in Newfoundland waters. ICES 1993/CCC Symposium. 11p.

Anderson, J.T., and **deYoung**, B. 1994. Stage-dependent density of cod eggs and larvae (*Gadus morhua* L.) in Newfoundland waters. ICES Mar. Sci. Symp. 198: 654-665.

Anderson, J.T., and **deYoung**, B. 1995. Application of a one-dimensional model to vertical distributions of cod eggs on the northeastern Newfoundland Shelf. Can. J. Fish. Aquat. Sci. 52: 1978-1989.

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Appendix 2. List of Scientific Staff, 1931-2000.

Appendix 2: List of Scientific Staff, 1931-2000.

NAME			FROM	TO	NOTES
Akenhead, S.A.	(Scott)		November 1, 1976	September 4, 1990	
Anderson, J.T.	(John)		March 13, 1979	present	
Anderson, M.R.	(Robin)	and	November 11, 1991 December 15, 1992	August 14, 1992 present	
Anderson, T. C.	(Tim)	and	August 15, 1983 December 5, 1994	March 3, 1989 present	Formerly full-time technical staff Fisheries Management Branch between March 1989 and December 1994
Andrews, G.L.	(Gertrude)		November 1, 1950	April 30, 1955	
Atkinson, D.B.	(Bruce)		August 22, 1978	present	Formerly full-time technical staff
Bain, L.H.	(Hugh)		September 4, 1979	August 15, 1988	
Baird, J.W.	(Jim)		February 9, 1981	April 13, 1993	Formerly full-time technical staff
Banoub, J.H.	(Joe)		October 4, 1979	present	
Barnes, M.A.	(Marvin)	and	November 8, 1982 December 5, 1994	February 6, 1989 present	Fisheries Management Branch between February 1989 and December 1994
Barrowman, N.	(Nick)		December 16, 1994	August 22, 1996	
Bauld, C.	(Cathy)		November 29, 1982	July 27, 1984	Formerly full-time technical staff
Bishop, C.A.	(Claude)		June 1, 1973	July 15, 1995	Formerly full-time technical staff
Black, G.A.	(Geoff)		April 15, 1984	May 22, 1985	Post-doctoral fellowship
Black, W.R.	(Bob)		June 30, 1972	1975	
Blair, A.A.	(Art)		1939	March 6, 1970	
Botta, J.R.	(Rick)		January 2, 1974	October 1, 1976	
Bourgeois, C.E.	(Chuck)		May 30, 1983	present	
Bowdring, T.	(Tony)		October 3, 1994	present	Formerly full-time technical staff
Bowen, W.D.	(Don)		September 11, 1978	June 30, 1984	
Bowering, W.R.	(Ray)	and	June 1, 1973 January 1, 1993	January 1, 1991 present	Formerly full-time technical staff Interchange Canada assignment with Fishery Products International between January 1991 and January 1993
Bradbury, C.	(Carol)		March 1, 1999	present	
Brattey, J.	(John)		September 22, 1986	present	Post-doctoral fellowship to March 28, 1988
Brodie, W.B.	(Bill)		March 17, 1980	present	Formerly full-time technical staff
Bromley, C.	(Charlie)	*	March 4, 1992	present	
Brown, B.	(Brenda)		June 12, 2000	present	
Bruce, W. J.	(Willie)		January 1, 1976	July 11, 1983	Resource Development Branch prior to January 1, 1976
Bundy, A.	(Alida)		January 2, 1998	June 30, 1998	Post-doctoral fellowship
Button, C.E.	(Clar)		January 1, 1976	September 19, 1977	Resource Development Branch prior to January 1, 1976
Cadigan, N.G.	(Noel)		April 30, 1990	present	
Campbell, J.S.	(Scott)	and	January 22, 1973 April 1, 1991	April 1, 1974 present	Gulf Region and Central & Arctic Region between April 1974 and April 1991
Carscadden, J.E.	(Jim)		April 1, 1975	present	
Chabot, D.	(Denis)		September 1, 1992	March 31, 1993	Post-doctoral fellowship
Chadwick, E.M.P.	(Mike)		August 23, 1976	September 7, 1982	
Chilvers, R.M.	(Roy)		August 17, 1956	August 27, 1958	
Clarke, K.	(Keith)		September 21, 1998	present	
Clements, C.J.	(Carol)	*	May 11, 1981	September, 1982	
Coady, L.W.	(Larry)	and	January 1, 1976 February 25, 1980	March 31, 1976 June 2, 1996	Resource Development Branch prior to January 1, 1976 Environment Canada between March 1976 & February 1980
Colbourne, E.	(Eugene)		October 2, 1989	present	
Conan, G.Y.	(Gerard)		April 1, 1995	January 22, 1997	

Appendix 2 (Cont'd.)

NAME			FROM	TO	NOTES
Cone, D.K.	(Dave)		May 21, 1980	February, 1982	Post-doctoral fellowship
Craig, J.	(Joe)		June 21, 1999	present	
Cross, T.	(Tom)		April 9, 1975	March 31, 1977	Post-doctoral fellowship
Dalley, E.L.	(Edgar)		June 8, 1978	present	
Davis, D.	(Denise)	*	March 21, 1983	present	
Davis, M.B.	(Ben)		February 11, 1991	August 25, 2000	Assignment at Headquarters (Ottawa) from August 2000
Dawe, E.G.	(Earl)		December 13, 1979	present	
Dawe, M.B.	(Mary)		October 30, 2000	present	
DeBlois, E.M.	(Elizabeth)		September 1, 1993	August 25, 1995	Post-doctoral fellowship
Dempson, J.B.	(Brian)		July 26, 1976	present	Assignment with Pacific Region August 1995 to February 1996
Dey, A.C.	(Arun)		April 1, 1980	April 1, 1985	
Easton, M.	(Mike)		September, 1975	May 1, 1982	
Ellis, R.W.	(Ron)		August 27, 1953	March 4, 1955	
Ennis, G. P.	(Gerry)		July 1, 1968	present	Formerly full-time technical staff
Evans, G.T.	(Geoff)	and	March 9, 1982 February, 1993	February 15, 1990 present	Executive Scientist, Joint Global Ocean Flux Study (JGOFS) in Kiel, West Germany from February 1990 to February 1993
Fahrig, L.	(Lenora)		September 1, 1989	June 29, 1991	
Fairbairn, D.	(Daphne)		August 1, 1978	August 14, 1980	
Fancey, L.L.	(Linda)	 and and and and and	October 1, 1978 October 9, 1979 February 3, 1981 October 22, 1984 October 2, 1987 January 15, 2001	January 21, 1979 September 7, 1980 January 5, 1982 December 31, 1986 May 5, 2000 present	Formerly full-time technical staff
Farwell, M.K.	(Morley)		January 1, 1976	March, 1976	Resource Development Branch prior to January 1, 1976
Fiander, D.	(Darlene)	*	April 1, 1997	present	Full-time data entry position prior to April 1997
Finn, R.D.	(Ray)		December 5, 1994	present	Fisheries Management Branch prior to December 1994
Fleming, A.M.	(Allister)	 and	1947 September 1, 1965	August 31, 1964 December, 1977	Formerly full –time technical staff Headquarters (Ottawa) assignment from August 1964 to September 1965
Frost, N.	(Nancy)		1931	1942	
Gare, R.L.	(Ron)		October 2, 1972	March, 1975	
Garman, G.C.	(Greg)		July 23, 1984	June 21, 1985	Post-doctoral fellowship
Gavaris, C.A.	(Carol)		January 2, 1979	July 3, 1982	
Gavaris, S.	(Stratis)		January 2, 1979	June 2, 1984	
Gentil, E.	(Emmanuel)		June 1, 1994	May 29, 1996	Post-doctoral fellowship
Gibson, R.J.	(John)		January 2, 1980	March 28, 1997	Scientist emeritus 1997 to present
Giles, M.A.	(Mike)		May 31, 1973	March, 1975	
Gilkinson, K.	(Kent)		June 1, 2000	present	
Goff, G.P.	(Greg)		September 14, 1984	December 13, 1986	Post-doctoral fellowship
Goodyear, J.	(Julian)	*	September 3, 1987	May, 1996	
Goosney, R.F.	(Rick)	*	May 15, 1978	present	
Gosse, M.M.	(Michelle)	*	December 5, 1994	September 18, 2000	Fisheries Management Branch prior to December 1994 Assignment with Canadian Coast Guard from September 2000
Gregory, R. S.	(Bob)		August 1, 2000	present	

Appendix 2 (Cont'd.)

NAME			FROM	TO	NOTES
Hampton, W.G.	(Bill)		1935	1943	
Handrigan, G.L.	(Les)		1947	1951	
Hay, K.A.	(Keith)		November 1, 1978	April 30, 1985	
Healey, B.	(Brian)		January 24, 2000	present	
Helbig, J.	(Jim)		September 2, 1988	present	
Hellou, J.	(Jocelyn)	 and and and	February 13, 1985 April, 1987 April, 1989 September, 1996	November 12, 1986 December, 1987 September, 1995 February, 1997	Post-doctoral fellowship to January 5, 1986
Hennessey, J.P.	(John)		1947	May 31, 1951	Formerly full-time technical staff
Hodder, V.M.	(Vince)		July 1, 1956	September 14, 1971	Formerly full-time technical staff
Hoddinott, P.	(Paul)	*	April 1, 1987	September 1, 1995	
Hoenig, J.M.	(John)		March 6, 1989	August 26, 1997	
Holland, D.M.	(Dave)		June 27, 1988	August 19, 1989	
Hop, H.	(Hakaan)		November 15, 1993	January 13, 1995	Post-doctoral fellowship
Hourston, A.S.	(Al)		September 1, 1966	June 30, 1968	
Hunt, R.P.	(Bob)		1951	May 11, 1954	
Hunter, R.	(Robin)		April 10, 1978	March 2, 1979	
Hurley, G.	(Geoff)		August 28, 1978	December, 1979	
Hutchings, J.A.	(Jeff)		April 22, 1993	April 19, 1995	Post-doctoral fellowship
Hyslop, D.	(Dave)		June 12, 2000	March 30, 2001	
Janes, T.	(Todd)	*	April 4, 1994	March 31, 2000	
Johnson, B.G.H.	(Herb)		June 15, 1951	May 8, 1956	
Johnston, A.B.	(Allan)		1935	1945	
Kane, K.M.	(Kevin)		April 1, 1971	March 3, 1972	Technology Unit prior to April I, 1971
Keir, R.S.	(Ron)		June 12, 1951	October 27, 1954	
Kendaris, T.	(Ted)		June 25, 1980	April 24, 1981	Post-doctoral fellowship
Kennedy, V.S.	(Vic)		September 20, 1974	April 27, 1976	Post-doctoral fellowship
Kiceniuk, J.W.	(Joe)		September 2, 1975	March 31, 1998	Scientist emeritus 1998 to present
King, L.	(Leon)		April 1, 1996	present	Formerly full-time technical staff
Knapp-Fisher, R.C.	(Robin)		July 14, 1951	July 28, 1954	
Kruse, G.H.	(Gord)		January 15, 1984	June 28, 1985	Post-doctoral fellowship
Kulka, D.W.	(Dave)	 and	October 3, 1977 May 1, 1985	October 14, 1984 present	Headquarters (Ottawa) between October 1984 & May 1985
Lambert, D.G.	(Sim)		July 13, 1953	February 2, 1955	
Lang, C.	(Chris)	*	April 10, 1989	present	
Laprise, R.	(Rejean)		April 1, 1991	August 31, 1993	Post-doctoral fellowship
Lauder, J.	(Jack)		April 1, 1971	October 1, 1976	Technology Unit prior to April 1, 1971
Lawson, J.	(Jack)		April 1, 1993	March 30, 1995	Post-doctoral fellowship
Lear, W.H.	(Henry)		May 15, 1967	August 14, 1989	Formerly full-time technical staff
Lee, Y.Z.	(Yung)		November 3, 1975	October 31, 1977	Post-doctoral fellowship
Lilly, G.R.	(George)		June 19, 1978	present	
Lindsay, S.T.	(Sheila)		1931	1936	
Lobel, P.	(Paul)		November, 1982	March 31,1984	Post-doctoral fellowship
MacCallum, W.A.	(Wally)		April 1, 1971	August 28, 1972	Technology Unit prior to April 1, 1971
MacPherson, H.D.	(Hector)		August 13, 1952	September 24, 1955	
MacPherson, N.L.	(Norman)		1931	1937	
Maddock-Parsons, D.	(Dawn)		July 28, 1999	present	
Maillet, G.	(Gary)		November 1, 1999	present	
Mansour, A.	(Atef)		May 19, 1998	May 18, 2000	Post-doctoral fellowship
Marshall, G.	(Geoff)	*	February 1, 1982	August 10, 1991	

Appendix 2 (Cont'd.)

NAME			FROM	TO	NOTES
Mathieu, A.	(Anne)		October 1, 1992	September 19, 1994	Post-doctoral fellowship
May, A.W.	(Art)	and	May 13, 1958 August 7, 1973	June 30, 1971 August 14, 1974	Headquaters (Ottawa) between June 1971 and August 1973 Scientist emeritus 2000 to present
McCubbin, R.N.	(Rick)		October 15, 1984	December 15, 1989	Formerly full-time technical staff
McKone, W.D.	(Doug)		February 1, 1975	May, 1981	
Meerburg, D.	(Dave)		September 20, 1976	June 14, 1979	
Mercer, D.	(Dawn)		February 3, 2000	present	
Mercer, M.C.	(Mac)	and	August 2, 1965 August 31, 1981	May 1, 1976 May, 1990	Headquarters (Ottawa) between May 1976 and August 1981
Mertz, G.	(Gordon)		January 3, 1989	September 9, 1997	
Michon, F.	(Francis)		October 28, 1980	January, 1983	Post-doctoral fellowship
Millar, R.B.	(Russell)		May 1, 1989	March 12, 1992	
Miller, D.S.	(Dan)		June 28, 1977	March 31, 1998	
Miller, R.J.	(Bob)		April 28, 1971	May 31, 1979	
Misra, R.K.	(Ra)		May 23, 1975	August 31, 1982	
Moores, J.A.	(John)		May 9, 1972	May 9, 1983	
Morgan, M.J.	(Joanne)	and	September 8, 1987 August 10, 1998	February 9, 1998 present	Post-doctoral fellowship to November 22, 1988
Morry, C.J.	(Chris)		January 1, 1976	September 5, 1977	Resource Development Branch prior to January 1, 1976
Mowbray, F.	(Fran)		March 15, 1999	present	
Mullins, C.	(Conrad)		April 1, 1994	present	Formerly Gulf Region
Murphy, E.G.	(Eugene)		February 12, 1990	present	Formerly full-time technical staff
Murray, A.R.	(Al)		July 7, 1953	July 18, 1969	
Myers, R.A.	(Ran)		May 18, 1983	April 5, 1997	Post-doctoral fellowship to March 30, 1984
Naidu, K.S.	(San)	and	January 10, 1975 January 1, 1994	April 30, 1992 present	Interchange Canada assignment with Clearwater Fisheries between April 1992 & January 1994
Nakashima, B.S.	(Brian)		January 14, 1980	present	
Narayanan, S.	(Savi)		May 9, 1988	March 23, 1997	
Ni, I-H.	(I-Hsun)		February 1, 1978	November 28, 1991	
Noble, L.D.	(Lisa)	and	December 1, 1997 October 30, 1998	June 2, 1998 present	
Nyman, O.L.	(Leinart)		September 27, 1968	September 22, 1970	
O'Brien, J.	(John)		September 1, 1998	present	Formerly full-time technical staff
O'Connell, M.R.	(Mike)		June 9, 1980	present	
Olsen, S.J.	(Steiner)		November 23, 1956	July 13, 1960	
O'Rourke, J.M.	(Jack)		June 2, 1999	present	Fisheries Management Branch prior to June 1999
Orr, D.	(David)		February 22, 1999	present	
Paranjape, M.A.	(Madhu)		August 31, 1987	March 16, 1996	
Park, L.	(Laura)		July 15, 1997	present	
Parmiter, D.	(Dale)		October 2, 2000	present	
Parsons, D.G.	(Don)		August 28, 1972	present	
Parsons, L.S.	(Scott)		May 21, 1968	April 15, 1976	
Pauls, C.J.	(Cyril)		May 1, 1969	September 14, 1970	
Payne, J.F.	(Jerry)		April 30, 1973	present	
Payne, R.H.	(Ron)		August 26, 1971	June 30, 1977	
Payton, N.	(Nick)		August 28, 1989	April 15, 1993	NCARP assignment April to September 1993
Penney, R.	(Randy)		January 18, 1988	present	Formerly full-time technical staff
Penrose, W.R.	(Bill)		June 27, 1972	February 2, 1980	
Pepin, P.	(Pierre)		February 3, 1986	present	
Pepper, V.A.	(Ven)		January 1, 1976	present	Resource Development Branch prior to January 1, 1976

Appendix 2 (Cont'd.)

NAME			FROM	TO	NOTES
Perry, G.	(Geoff)	And	September 1, 1997 January 1, 2001	June 15, 1999 present	Middle Management Trainee Program from August, 1992.
Pinhorn, A.T.C.	(Al)		May 16, 1960	March 30, 1994	Formerly full-time technical staff Chair-CAFSAC 1979 to 1981 Scientist emeritus 1994 to present
Pippy, J.H.C.	(John)		January 16, 1969	September 30, 1995	
Pitt, T.K.	(Tom)		July 1, 1950	March 31, 1986	
Porter, E.L.	(Ed)		January 1, 1987	September 30, 1987	
Porter, T.R.	(Rex)	And	January 1, 1976 October, 1988	April, 1988 present	Resource Development Branch prior to January 1, 1976. Assignment Headquarters (Ottawa) between April and October 1988
Power, A.	(Annette)		December 16, 1996	present	
Power, D.	(Don)		January 13, 1986	present	Formerly full-time technical staff
Pratt, J.D.	(Jerry)		July 7, 1980	August 31, 1993	Resource Development Branch and DFO (HQ) prior to 1980
Prouse, M.E.	(Marjorie)		July 1, 1956	September 19, 1958	
Radtke, R.L.	(Richard)		December 15, 1978	December 14, 1980	Post-doctoral fellowship
Ray, S.	(Sankar)		December 19, 1988	May 30, 1998	Scientist emeritus 1998 to present
Reddin, D.G.	(Dave)		July 19, 1976	present	
Rees, E.I.S.	(Ivor)		1959	March 15, 1963	
Rice, J.C.	(Jake)		June 21, 1982	September, 1990	
Rioux, P.	(Peter)	*	February 23, 1999	March 31, 2001	
Roberge, M.M.	(Michelle)		April 9, 1990	present	
Roff, D.	(Derek)		June 1, 1978	August 14, 1980	
Rose, G.	(George)		September 1, 1988	December 31, 1995	
Ryan, P.M.	(Pat)		June 19, 1978	April 16, 1998	
Sandeman, E.J.	(Sandy)	and	July 24, 1953 February 19, 1976	September 15, 1975 March 31, 1988	A/Director, St. Andrew's Biological Station between September 1975 and February 1976
Schwinghamer, P.	(Peter)		July 14, 1987	December 20, 1997	Assigned to Bedford Institute in 1995
Scruton, D.A.	(Dave)		August 12, 1981	present	
Segovia, A.M.	(Andrea)	*	February 1, 1993	March 31, 2000	
Senciall, D.R.	(Dave)		May 8, 1989	present	
Sergeant, D.E.	(Dave)		October 2, 1951	October 1, 1955	
Shackell, N.	(Nancy)		June 1, 1992	May 27, 1994	Post-doctoral fellowship
Shaw, D.H.	(Derek)		April 1, 1971	March 8, 1997	Technology Unit prior to April 1, 1971
Sheldon, R.W.	(Ray)		January 4, 1988	December 15, 1993	
Shelton, P.	(Peter)		August 28, 1989	present	
Simms, J.	(Jason)		February 3, 2000	present	
Sjare, B.	(Becky)		July 5, 1993	present	
Skirving, P.D.	(Paul)		March 1, 1982	June 12, 1982	Formerly full-time technical staff
Smith, S.	(Steve)		January 8, 1979	November 27, 1980	
Snow, S.	(Steven)		December 16, 1996	present	
Somerton, G.D.	(Gary)	*	July 10, 1979	March 31, 2000	
Sooley, D.	(Darren)		December 5, 1994	present	Fisheries Management Branch prior to December 1994
Squires, H.J.	(Hubert)		May 13, 1950	May 30, 1968	
Stansbury, D.E.	(Don)		February 1, 1980	present	
Stenson, G.B.	(Gary)		October 15, 1985	present	
Stevens, C.R.	(Chris)	*	August 1, 1983	present	Formerly full-time technical staff
Stevenson, S.C.	(Spencer)		July 4, 1977	November 6, 1990	Formerly full-time technical staff
Stewart, T.N.	(Tom)		July 19, 1952	September 7,1955	
Stirling, C.H.	(Charlie)	*	November 1, 1997	present	Formerly full-time technical staff
Striha, R.	(Bob)		April 1, 1971	April 4, 1975	Technology Unit prior to April 1, 1971
Taggart, C.T.	(Chris)		September 16,	August 31, 1995	Assigned to Cod Genetics/Physiology Project

Appendix 2 (Cont'd.)

NAME			FROM	TO	NOTES
			1991		at Dalhousie University June 1994 to August 1995
Taylor, D.M.	(Dave)		September 20, 1978	present	Formerly full-time technical staff
Templeman, W.J.	(Wilfred)		1938	March, 1972	J. L. Paton Professor of Marine Biology and Fisheries, Memorial University of Newfoundland 1972-1982 Scientist emeritus 1982 to 1990
Thompson, H.	(Harold)		July 5, 1930	1936	
Tibbo, S.N.	(Noel)		1940	1950	
Tillman, J.M.	(Joe)		April 1, 1999	present	
Traylen, A.D.	(Alfred)		July 22, 1953	July 20, 1954	
Trenholm, D.	(Don)		May 17, 1997	present	Formerly Canadian Coast Guard
Tucker, R.J.	(Reg)	*	January 1, 1976	June 2, 1993	Formerly full-time technical staff
Veinott, G.	(Geoff)		May 31, 1999	present	
Verspoor, E.	(Eric)		November 15, 1984	November 14, 1985	Post-doctoral fellowship
Waldron, D.	(Don)		January 1, 1976	July 17, 1977	Resource Development Branch prior to January 1, 1976
Walsh, F.	(Frank)		April 1, 1996	present	Formerly full-time technical staff
Walsh, S.J.	(Steve)		March 12, 1979	present	Formerly full-time technical staff
Warren, W.G.	(Bill)		May 15, 1989	May 16, 1997	
Wells, R.	(Dick)		May 14, 1962	December 19, 1989	Chair-CAFSAC January, 1985 to November, 1986
Wheeler, J.P.	(John)		October 15, 1979	present	
Whiteley, G.C.	(George)		1931	1935	
Wiggins, W.G.B.	(Glen)		June 13, 1950	September 11, 1951	
Wiles, M.	(Mike)		October 8, 1965	July 31, 1967	
Williams, U.	(Urban)		June 15, 1988	June 19, 1998	Formerly full-time technical staff
Williamson, G.R.	(Gordon)		December 15, 1960	July 3, 1963	
Wilson, A.M.	(Anna)		1931	1944	
Winters, G.H.	(George)		May 2, 1966	March 31, 1998	
Wiseman, R.J.	(Bob)		January 1, 1976	August 31, 1987	Resource Development Branch prior to January 1, 1976
Xu, X.	(Xucai)		January 21, 1991	March 31, 1993	Post-doctoral fellowship

* excluded from analyses

Appendix 3. Organization units (Divisions) – Science Branch, 1985-2000.

1985 – 1986					
Groundfish	Pelagic Fish, Shellfish & Marine Mammals	Freshwater & Anadromous Fish	Experimental Ecology		
1987 – 1991					
Groundfish	Pelagic Fish, Shellfish & Marine Mammals	Freshwater & Anadromous Fish	Experimental Sciences	Oceanography Hydrography & Toxicology	
1992 – 1994					
Groundfish	Pelagic Fish, Shellfish & Marine Mammals	Salmonid & Habitat Science	Experimental Sciences		
1995 – 1996					
Groundfish	Pelagic Fish, Shellfish & Salmonids	Ocean Ecology	Environmental Sciences	Marine Environment & Habitat Management	
1997					
Groundfish	Pelagic Fish, Shellfish & Salmonids	Ocean Ecology	Environmental Sciences	Marine Environmental & Habitat Management	Hydrography
1998					
Groundfish,	Pelagics, Shellfish, Salmonids & Marine Mammals	Environmental Sciences	Marine Environment & Habitat Management	Hydrography	
1999					
Groundfish	Pelagics, Shellfish, Salmonids & Marine Mammals	Environmental Sciences	Marine Environment & Habitat Management	Hydrography	Oceans Programs
2000					
Aquatic Resources	Oceans Programs	Marine Environmental & Habitat Management	Hydrography		

Note: In addition to the foregoing organizational arrangements by Division, a national Centre for Disciplinary Expertise (CODE) for Resource Assessment and Survey Methodology was in place in the Newfoundland Region from 1987 to 1997.